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Application No. 10/667,238  
Response to Office Action of June 27, 2007

DEC 27 2007

REMARKS/ARGUMENTS

Claims 1-2, 5, and 7-23 remain pending. No new matter is believed to be added by the amendment. Applicants thank Examiner Fortuna for his suggestions in the outstanding Office Action and respectfully request consideration of the remarks below.

The rejections of Claims 1-2, 5, and 7-23 under 35 U.S.C. §112, second paragraph, for the alleged indefinite range that recites "the amount of the boron-containing compound is equal to or less than about 7% by weight of the starch" is traversed below.

The Office has taken the position that the above-mentioned language of Claim 1 renders Claims 1-2, 5, and 7-23 indefinite since such language affords a lower level that "could be zero". Applicants respectfully disagree with the Office's interpretation of these claims because such interpretation is not consistent with the controlling precedent case law or the MPEP. The controlling case on this point is *In re Kirsch*, 498 F.2d 1389, 182 USPQ 286 (CCPA 1974). In *Kirsch*, the CCPA decided the meaning of "less than" phrases in chemical cases containing open ranges. In *Kirsch*, the USPTO took the position that the use of "less than" language in open ranges is vague and indefinite. The rejection was based on the view that the language of the

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recitation sets only a maximum amount of olefin and hence is inclusive of no olefin. The *Kirsch* Court did not see any merit in this rejection and this 112, second paragraph rejection was not sustained (See *Kirsch* at 290). Accordingly, the use of “less than” language in open ranges is not indefinite and such language should not be rejected under 35 U.S.C. §112, second paragraph. Section 2173.05(c) of the MPEP (see page 2100-217 of the MPEP) provides guidance on how to examine cases containing “less than” phrases in open ended ranges and directs Applicant’s and Examiner’s attention to the *Kirsch* decision as mentioned above. Like *Kirsch*, Claims 1-2, 5, 7-20 and 22 of the present case contains “less than” phrases in an open ended range. Like *Kirsch*, a rejection under such language in open ended ranges has no merit. Like *Kirsch*, Claims 1-2, 5, 7-20 and 22 are definite. Accordingly, Applicants respectfully request the Office to follow the case law and the MPEP; thereby withdrawing the rejection of Claims 1-2, 5, 7-20 and 22 under 35 U.S.C. §112, second paragraph.

The Office has further rejected Claims 21 and 23 under 35 U.S.C. §112, second paragraph for the same reasons as Claims 1-2, 5, 7-20 and 22. However, the Office’s attention is directed to Claims 21 and 23 which do not recite the “less than” language in open ended ranges, but rather state closed ranges of “from about 0.2% to about 7%” and from about 0.2% to about 5%, respectively. Accordingly, Applicants do not see

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how the rejection 35 U.S.C. §112, second paragraph, applies to Claims 21 and 23; and, respectfully request withdrawal of these grounds of rejection.

The rejections of Claims 1-2, 5, and 7-23 under 35 U.S.C. §102 and/or 35 U.S.C. §103 over US Patent No. 3,644,167 (US'167), and/or US Patent No. 4,853,085 (US'085) are traversed below.

US'167 and US'085 do not disclose paper substrates containing a boron-containing compound. In direct contrast, the claimed invention relates to a paper or paperboard containing a paper web that contains cellulosic fibers, starch and a boron-containing compound at an amount that is equal to or less than about 7% by weight of the starch where greater than 50% of the total amount of starch and boron-containing compound is located at or near the surfaces of the web, as well as methods of making the same. Accordingly, not all of the claim limitations are disclosed or suggested by US'167 and US'085.

Notwithstanding the above, the Office has relied upon US'167 and US'085 due to the Office's position in the above-traversed indefiniteness rejection that Claims 1-2, 5, and 7-23 include situations when the amount of boron-containing compound is zero. As discussed above, Applicants respectfully submit that the Office's current interpretation of Claims 1-2, 5, and 7-23 is incorrect and does not follow case law or

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the MPEP (see discussion above). Accordingly, Claims 1-2, 5, and 7-23 do not include situations when the amount of boron-containing compound is zero; and, not all of the claim limitations are disclosed or suggested by US'167 and US'085. Therefore, Applicants respectfully request withdrawal of this ground of rejection.

The rejections of Claims 1-2, 5, and 7-23 under 35 U.S.C. §103 over US Patent No. 3,112,214 (US'214) is traversed below.

US'214, at best, discloses pre-treating a cellulose sheet with a first solution containing at least 1% borax, drying, then sizing the dried pre-treated sheet with a very specific modified starch derivative having from 0.01 to 3.0 acyclic vic.-glycol groups per anhydroglucose unit within the starch. The Office has taken the position that US'214 generally disclose any amount of boron-containing compound and any amount of any starch may be included in a paper web. Applicants respectfully disagree with the Office's position for the following reasons:

- 1) US'213 explicitly states and teaches the criticality that at least 1%, preferably 5%, of the boron containing compound be applied to the sheet. Otherwise, the sheet is unsatisfactory (see Column 3, lines 14-19 of US'214);

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- 2) US'214 discloses that not any native starch may be applied to the sheet, but rather a very specific starch adduct having from 0.01 to 3.0 acyclic vic.-glycol groups per anhydroglucose unit. Otherwise, the sheet is unsatisfactory. (see Column 3, lines 9-13 and lines 48-52 of US'214); and
- 3) US'214 discloses that the sheet must be pre-treated and/or impregnated with an aqueous solution of borax and dried prior to surface sizing with the specific modified starch (see Column 2, lines 9-13 and 58-66 of US'214).

Applicants will clarify below why these distinctions are important.

The claimed invention relates to a paper or paperboard containing a paper web that contains cellulosic fibers, starch and a boron-containing compound at an amount that is equal to or less than about 7% by weight of the starch where greater than 50% of the total amount of starch and boron-containing compound is located at or near the surfaces of the web, as well as methods of making the same.

As discussed above in 1), US'213 explicitly states and teaches the criticality that at least 1%, preferably 5%, of the boron containing compound be applied to the sheet. Otherwise, the sheet is unsatisfactory (see Column 3, lines 14-19 of US'214).

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This is a direct teaching away from the claimed invention which requires less than 7% of the boron containing compound be present in the paper web. Further, dependent Claim 5 specifies that the amount of starch is equal to or less than 200 lbs per ton of fiber. There are 2000 lbs per ton. Therefore the amount % of starch is  $200/2000 = 10\%$ . Accordingly, the most amount of boron containing compound that can possibly be present (i.e. about 7% of the total amount of starch) is about 0.7% boron-containing compound. Accordingly, Claim 5 clearly represents situations taught away from by US'214 since US'214 explicitly states that the desired effect disclosed therein can not be achieved at less than 1% borax (see Column 3, lines 14-19 of US'214).

For this reason alone, US'214 fails to disclose, and actually teaches away from the claimed invention. However, Applicants will address reasons 2) and 3) mentioned above for completeness sake.

As discussed above in 2) above, US'214 discloses that not any native starch may be applied to the sheet, but rather a very specific starch adduct having from 0.01 to 3.0 acyclic vic.-glycol groups per anhydroglucose unit. Otherwise, the sheet is unsatisfactory. (See Column 3, lines 9-13 and lines 48-52 of US'214). This is also a direct teaching away from the claimed invention which requires starch, not an entirely different chemical. "Starch" as claimed in the present invention is not a starch adduct. As defined in the original specification and Claims 10-12, examples of starch as

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claimed in the present invention may be anionic, cationic, and/or amphipathic. As defined in the original specification and Claim 13, examples of native starches as claimed in the present invention may be corn starch, wheat starch, potato starch, rice starch, tapioca starch, and sago starch. These particular native starches are explicitly taught away from by US'214 at Column 3, lines 52-59. Nowhere in the present application, do the current claims recite a completely different adduct of starch.

The Office apparently is equating a very specific starch adduct having from 0.01 to 3.0 acyclic vic.-glycol groups per anhydroglucose unit (such as methyl, ethyl, or denatured ethyl alcohol) with starch as claimed. US'214 discloses that one must make this very specific adduct chemistry by reacting starch with small molecules such as epoxies or alcohol-containing epoxies (see column 2 and Examples V-VII of US'214). Applicants do not understand, without further explanation from the Office, how a very specific starch adduct having from 0.01 to 3.0 acyclic vic.-glycol groups per anhydroglucose unit can possibly be a starch as claimed in light of the drastic covalent manipulation disclosed by US'214. While starch is part of the recipe for making a very specific starch adduct having from 0.01 to 3.0 acyclic vic.-glycol groups per anhydroglucose unit, this does not inherently make the chemistry a starch as claimed. Nowhere in the present application, do the current claims recite a completely different adduct of starch. This fact, combined with the fact that US'214

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teaches the criticality of the adduct, demonstrates that the US'214 does not disclose or suggest the claimed invention.

As discussed above in 3) above, US'214 discloses that the sheet must be pre-treated and/or impregnated with an aqueous solution of borax and dried prior to surface sizing with the specific starch adduct (see Column 2, lines 9-13 and 58-66 of US'214). Applicants would like to direct the Office's attention to Claims 2, 16-17, and 19-20, and note that these claimed embodiments require that the boron-containing compound and the starch to be pre-mixed and then contacted with the sheet. US'214 clearly teaches away from pre-mixing the borax with the specific starch adduct at all as discussed above (see Column 2, lines 9-13 and 58-66 of US'214). Accordingly, US'214 can not possibly disclose or suggest the embodiments of Claims 2, 16-17, and 19-20 because US'214 teaches away from such claims.

In light of all of the above, Applicants respectfully request that the rejection over US'214 be withdrawn since US'214 clearly teaches away from the claimed invention.

For all of the above reasons, Applicants respectfully request that the above-mentioned rejections be withdrawn.

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Applicants respectfully submit that the present application is now in condition for allowance. Favorable reconsideration is respectfully requested. Should anything further be required to place this application in condition for allowance, the Examiner is requested to contact below-signed by telephone.

Please charge the amount of \$1050.00 required for the request for extension of time to our Deposit Account No. 09-0525. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 09-0525. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time.

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